

Name: _____

GCSE (1 – 9)

Recurring Decimals to Fractions

Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The marks for each question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end

- 1 Convert $\frac{2}{9}$ to a decimal.

$$\begin{array}{r} 0.2222 \\ 9 \overline{) 2.0000} \end{array}$$

0.2

(Total for question 1 is 2 marks)

- 2 Convert $\frac{4}{11}$ to a decimal.

$$\begin{array}{r} 0.36363 \\ 11 \overline{) 4.00000} \end{array}$$

0.36

(Total for question 2 is 2 marks)

- 3 Convert $\frac{5}{6}$ to a decimal.

$$\begin{array}{r} 0.83333 \\ 6 \overline{) 5.00000} \end{array}$$

0.83

(Total for question 3 is 2 marks)

- 4 Prove algebraically that the recurring decimal $0.\dot{8}$ can be written as $\frac{8}{9}$

$$\textcircled{1} \quad 0.\dot{8} = x$$

$$\textcircled{2} \quad 8.\dot{8} = 10x$$

$$\textcircled{2} - \textcircled{1}$$

$$8 = 9x$$

$$x = \frac{8}{9}$$

(Total for question 4 is 2 marks)

- 5 Prove algebraically that the recurring decimal $0.4\dot{7}$ can be written as $\frac{43}{90}$

$$\textcircled{1} \quad 0.4\dot{7} = x$$

$$\textcircled{1} \quad 4.\dot{7} = 10x$$

$$\textcircled{2} \quad 47.\dot{7} = 100x$$

$$\textcircled{2} - \textcircled{1}$$

$$43 = 90x$$

$$x = \frac{43}{90}$$

(Total for question 5 is 2 marks)

- 6 Prove algebraically that the recurring decimal $0.2\dot{3}$ can be written as $\frac{7}{30}$

$$0.2\dot{3} = x$$

$$\textcircled{1} \quad 2.\dot{3} = 10x$$

$$\textcircled{2} \quad 23.\dot{3} = 100x$$

$$\textcircled{2} - \textcircled{1}$$

$$21 = 90x$$

$$x = \frac{21}{90} = \frac{7}{30}$$

(Total for question 6 is 2 marks)

- 7 Write $0.\dot{1}\dot{6}$ as a fraction in its simplest form.

$$\begin{aligned}0.\dot{1}\dot{6} &= x \\1.\dot{6} &= 10x \\16.\dot{6} &= 100x \\15 &= 90x \\x &= \frac{15}{90} = \frac{1}{6}\end{aligned}$$

$$\frac{1}{6}$$

(Total for question 7 is 2 marks)

- 8 Write $0.2\dot{7}$ as a fraction in its simplest form.

$$\begin{aligned}0.2\dot{7} &= x \\2.\dot{7} &= 10x \\27.\dot{7} &= 100x \\25 &= 90x \\x &= \frac{25}{90} = \frac{5}{18}\end{aligned}$$

$$\frac{5}{18}$$

(Total for question 8 is 2 marks)

- 9 Write $0.4\dot{3}$ as a fraction in its simplest form.

$$\begin{aligned}0.4\dot{3} &= x \\4.\dot{3} &= 10x \\43.\dot{3} &= 100x \\39 &= 90x \\x &= \frac{39}{90} = \frac{13}{30}\end{aligned}$$

$$\frac{13}{30}$$

(Total for question 9 is 2 marks)

- 10 Prove algebraically that the recurring decimal $0.\dot{6}\dot{8}\dot{1}$ can be written as $\frac{15}{22}$

$$\begin{aligned}0.\dot{6}\dot{8}\dot{1} &= x \\6.\dot{8}\dot{1} &= 10x \\681.\dot{8}\dot{1} &= 1000x \\675 &= 990x \\x &= \frac{675}{990} = \frac{15}{22}\end{aligned}$$

(Total for question 10 is 2 marks)

- 11 Prove algebraically that the recurring decimal $0.\dot{2}\dot{1}\dot{6}$ can be written as $\frac{8}{37}$

$$\begin{aligned}0.\dot{2}\dot{1}\dot{6} &= x \\216.\dot{2}\dot{1}\dot{6} &= 1000x \\216 &= 999x \\x &= \frac{216}{999} = \frac{8}{37}\end{aligned}$$

(Total for question 11 is 2 marks)

- 12 Prove algebraically that the recurring decimal $0.\dot{1}\dot{2}\dot{6}$ can be written as $\frac{14}{111}$

$$\begin{aligned}0.\dot{1}\dot{2}\dot{6} &= x \\126.\dot{1}\dot{2}\dot{6} &= 1000x \\126 &= 999x \\x &= \frac{126}{999} = \frac{14}{111}\end{aligned}$$

(Total for question 12 is 2 marks)

- 13 Write $3.\dot{2}\dot{5}\dot{4}$ as a fraction in its simplest form.

$$\begin{aligned} 3.2\dot{5}\dot{4} &= x \\ 32.\dot{5}\dot{4} &= 10x \\ 3254.\dot{5}\dot{4} &= 1000x \\ 3222 &= 990x \\ x &= \frac{3222}{990} \end{aligned}$$

$$= \frac{179}{55} \text{ or } 3\frac{14}{55} \quad \frac{179}{55}$$

(Total for question 13 is 3 marks)

- 14 Write $2.7\dot{4}\dot{2}$ as a fraction in its simplest form.

$$\begin{aligned} 2.7\dot{4}\dot{2} &= x \\ 27.\dot{4}\dot{2} &= 10x \\ 2742.\dot{4}\dot{2} &= 1000x \\ 2715 &= 990x \\ x &= \frac{2715}{990} \end{aligned}$$

$$= \frac{181}{66} \text{ or } 2\frac{49}{66} \quad \frac{181}{66}$$

(Total for question 14 is 3 marks)

- 15 Write $3.\dot{5}\dot{9}\dot{4}$ as a fraction in its simplest form.

$$\begin{aligned} 3.\dot{5}\dot{9}\dot{4} &= x \\ 3594.\dot{5}\dot{9}\dot{4} &= 1000x \\ 3591 &= 999x \\ x &= \frac{3591}{999} \end{aligned}$$

$$= \frac{133}{37} \text{ or } 3\frac{22}{37} \quad \frac{133}{37}$$

(Total for question 15 is 3 marks)

16 x is an integer such that $1 \leq x \leq 9$

Prove that $0.\dot{0}\dot{x} = \frac{x}{99}$

$$\textcircled{1} \quad 0.\dot{0}\dot{x} = y$$

$$\textcircled{2} \quad \cancel{0}x.\dot{0}\dot{x} = 100y$$

$$\textcircled{2} - \textcircled{1} \quad x = 99y$$

$$y = \frac{x}{99}$$

(Total for question 16 is 2 marks)

17 Work out: $0.\dot{5}\dot{4} \times 0.\dot{5}$

$$0.\dot{5}\dot{4} = x$$

$$54.\dot{5}\dot{4} = 100x$$

$$54 = 99x$$

$$x = \frac{54}{99} = \frac{6}{11}$$

$$0.\dot{5} = y$$

$$5.\dot{5} = 10y$$

$$5 = 9y$$

$$y = \frac{5}{9}$$

$$\frac{6}{11} \times \frac{5}{9} = \frac{30}{99}$$

$$= \frac{10}{33}$$

$$\frac{10}{33}$$

(Total for question 17 is 4 marks)

18 Work out: $0.\dot{3}\dot{9} \div 0.\dot{6}\dot{3}$

$$\begin{aligned}0.\dot{3}\dot{9} &= x \\ 39.\dot{3}\dot{9} &= 100x \\ 39 &= 99x \\ x &= \frac{39}{99} \\ &= \frac{13}{33}\end{aligned}$$

$$\begin{aligned}0.\dot{6}\dot{3} &= y \\ 63.\dot{6}\dot{3} &= 100y \\ 63 &= 99y \\ y &= \frac{63}{99} \\ &= \frac{7}{11}\end{aligned}$$

$$\frac{13}{33} \div \frac{7}{11}$$

$$\frac{13}{\cancel{33}} \times \frac{\cancel{11}^1}{7} = \frac{13}{21}$$

$$\frac{13}{21}$$

(Total for question 18 is 4 marks)

19 Work out: $0.0\dot{7} \div 0.\dot{1}8\dot{5}$

$$\begin{aligned}0.0\dot{7} &= x \\ 0.\dot{7} &= 10x \\ 7.\dot{7} &= 100x \\ 7 &= 90x \\ x &= \frac{7}{90}\end{aligned}$$

$$\begin{aligned}0.\dot{1}8\dot{5} &= y \\ 185.\dot{1}8\dot{5} &= 1000y \\ 185 &= 999y \\ y &= \frac{185}{999} \\ &= \frac{5}{27}\end{aligned}$$

$$\frac{7}{90} \div \frac{5}{27}$$

$$\frac{7}{\cancel{90}_{10}} \times \frac{\cancel{27}^3}{5} = \frac{21}{50}$$

$$\frac{21}{50}$$

(Total for question 19 is 4 marks)